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CENTER FOR GEOTECHNICAL MODELING

INVESTIGATION AND EVALUATION OF LIQUEFACTION RELATED GROUND DISPLACEMENTS AT MOSS LANDING DURING THE 1989 LOMA PRIETA EARTHQUAKE

APPENDICES A, B & C

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ABSTRACT

The 1989 Loma Prieta earthquake caused extensive liquefaction in the area of Moss Landing, located midway between Santa Cruz and Monterey on Monterey Bay. The results of an investigation and evaluation of liquefaction-related ground displacements at select locations in the Moss Landing area are presented in this report. Effects of the earthquake ranged from no observable deformation or damage at some locations, to more than 2 m of liquefaction-induced lateral spreading at the nearly collapsed, $6 million Moss Landing Marine Laboratory. This study provides information regarding the range of earthquake effects and ground displacements observed, the various soils encountered, the detailed stratigraphy at several sites, the different insitu testing methods used, and a unique set of inclinometer data within a laterally spreading shoreline. Analyses of these data provide insight into the application of commonly used methodologies for predicting the occurrence and effects of earthquake-induced liquefaction. These data are also compared against current semi-empirical correlations between cyclic strength and the results of standard penetration test (SPT), cone penetration test (CPT), and shear wave velocity measurements. Lessons are drawn regarding the influence of thin soil strata on overall site behavior, the use of SPT, CPT and shear wave velocity measurements to identify critical strata, and the distribution of deformations within a lateral spread as described by inclinometer measurements. It is hoped that the data and results presented in this report will provide a basis for further development of design methodologies for predicting the potential for liquefaction-related damage during earthquakes.